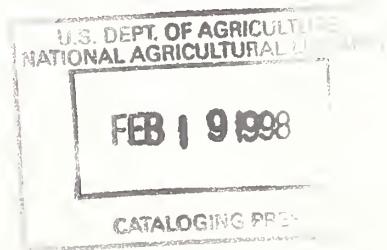


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Price Spreads for **FORMULATED POULTRY FEEDS** in Illinois

Marketing Research Report No. 378

Marketing Economics Research Division
Agricultural Marketing Service
U. S. DEPARTMENT OF AGRICULTURE



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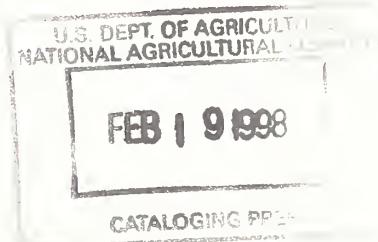
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2004

PREFACE

The manufacturer-wholesaler margin as used in this study is the difference between the wholesale price of formulated poultry feed and the actual cost of the ingredients. The retail margin is the difference between the wholesale price of the poultry feed and the retail price paid by the farmer for that particular type of feed. The farmer's share is the price received by the farmer for the equivalent ingredients in a particular type of poultry feed, expressed as a percentage of the retail price paid by farmers for that type of feed. All of these price spreads or margins are expressed as percentages and are used to show trends.

Basic research of this type is part of the Department's broader program designed to increase efficiency in marketing farm products. The farmer has a double stake in this industry's efficiency since he not only produces the feed ingredients but also purchases the final formula feeds.

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February 1960

SUMMARY

Prices of broiler and laying mashes in Illinois decreased about 5 percent from 1953 to 1958. Prices of ingredients used in the manufacture of these formula feeds decreased even more rapidly during the period.

Manufacturers use many different ingredients in poultry feeds. Because there is no known average formula for each type of feed produced in a given year, it is hard to find the cost of ingredients for the formula feeds priced at retail. Also, between 1953 and 1958 many manufacturers changed their formulas. The new formulas reflected both changes in prices of some ingredients and improved knowledge of nutrition. The analyses in this report are based on two groups of formulas, assumed to be fairly typical of alternative formula feeds' priced at retail before and after the improvements were adopted. Some tentative conclusions about the Illinois feed industry, suggested by this study, are as follows:

The manufacturer-wholesaler margin and the retail margin increased by about equal amounts between 1954 and 1958. Increases in the cost of some of the major cost items, such as labor and transportation, account for much of this increase in the marketing margin.

The handling, storage, and merchandising margin for ingredients (difference between the cost of ingredients at wholesale and the prices received by farmers for equivalent quantities) increased rapidly for soybean meal and decreased somewhat for bran and middlings from 1953 to 1958. Two trends influenced this margin: (1) rapid decreases in the prices of soybean meal and grain, and (2) increased demand for production of high-energy feeds (containing large proportions of grain) during the period. As a result, prices and margins for wheat bran and middlings fell slightly and margins for soybean meal rose at a time when prices and margins for soybean oil were decreasing.

The farmer's share of the retail price of these poultry formula feeds remained almost stable at about 50 percent. This near stability was primarily the result of the shift toward high-energy feeds which occurred during the period. If formulas had not changed, the farmer's share would have decreased nearly 20 percent during the period.

This study shows the need to establish changing representative formulas (within nutritional allowances, used by the industry) before a more detailed analysis can be made of marketing margins for formula feed. Marketing margins in the formula feed industry cannot be determined accurately with the data now available. However, results of this study show that it is possible to give indications of the degree and direction of changes in the margins.

PRICE SPREADS FOR FORMULATED
POULTRY FEEDS IN ILLINOIS

By V. John Bremsike and Carl J. Vosloh, Jr., agricultural
economists, Marketing Economics Research Division,
Agricultural Marketing Service

For many years the U. S. Department of Agriculture has conducted continuing and periodic analyses of price spreads, marketing margins, and the farmer's share for many items of food and clothing. Since the farmer is both the producer of most of the ingredients of formulated poultry feeds and the purchaser of the final product, the Department is also interested in marketing margins for formula feeds.

No detailed study of this type has been made because of the numerous difficulties encountered in making such an analysis. Some of these difficulties have been overcome; for example, prices paid by farmers have been reported for certain types of formula feed since 1951.^{1/} Other problems are still at least as difficult as they ever have been. For example, the reported prices paid by farmers for laying mash and for broiler mash are averages for the largest selling feed of each type. Prices are not obtained for specific formulas or brands of feed. The prices paid by farmers also cover an average amount of services such as credit, delivery, bulk handling, or bagging, depending on the usual method of pricing. But the reported prices still represent the quality of the feed and services purchased during each year from 1953 to 1958 for a significant portion of the formula feed.

Formula feeds are a mixture of many grains, oilmeals, and other ingredients, as well as minerals, vitamins, and drugs. Each formula feed supplies the needs of livestock or poultry through a combination of perhaps 10 to 20 individual items with considerable elasticity for substitution.

To find the equivalent cost of ingredients for such a heterogeneous product and determine margins accurately thus becomes a difficult task. However, recent progress in the use of mechanical computers by large companies to compute least-cost formulas providing specified nutritional requirements within certain stated ingredient levels, appearance, and other restrictions indicates some possibility for future success. Since formulas of this type are not available this report is based upon an analysis of contrasting formulas. For

^{1/} Agricultural Prices. U. S. Dept. Agr., Agr. Mktg. Serv.

each type of formula feed (laying mash and broiler mash) one high-grain and one low-grain formula were studied. 2/

Formulas used in this study were selected from those published in the 1947 and 1957 editions of the Feed Trade Manual. 3/ The recent formulas, both high and low grain, contain more grain than the earlier formulas, as well as ingredients such as vitamins and antibiotics which the earlier formulas did not include. Formulas for both years were used in this study.

The objectives of this study are to analyze for poultry feeds (1) the value of price spreads for any one of these formulas as indicators of the actual size of margins--for example, the gross margin for the manufacturer-wholesaler--for a particular type of feed; (2) the value of price spreads for any of the formulas as indicators of trends in margin size; and (3) the factors that have influenced either the actual margin or trends in the margin.

These analyses apply only to poultry feed manufactured in Illinois and sold at retail in Illinois. 4/ Retailer-manufacturers receive the combined retail and wholesale-manufacturing margins which are shown separately in the report. This study does not analyze the margin for formula feed retained by manufacturers and used in an integrated poultry or livestock operation, nor the margin for feed mixed in a custom mixing or service type of operation.

PRICE SPREADS FOR INDIVIDUAL FORMULAS AS INDICATORS OF FORMULA FEED MARGINS 5/

Margins for a given type of formula feed can be calculated on the basis of one formula only if (1) it is possible to determine an average formula which is representative of each type of feed purchased by the farmers, or (2) the prices of all alternative ingredients are directly related to their value in the formula and therefore result in almost identical ingredient costs and margins irrespective of the formula used.

The first procedure cannot be employed because the quality of formula feeds and the quantity of each ingredient used in each type of formula feed are unknown. The manufacturer-wholesaler margins for high- and low-grain formulas are compared (table 1), to test the possibility that the prices of the alter-

2/ High-grain formulas are those with large proportions of grain to supply high energy; low-grain formulas contain less grain and more fibrous ingredients such as wheat bran and middlings. See the section on methodology for more detail. Basically this study assumes that either the high-grain formula or the low-grain formula (or a formula between these extremes) could have been sold at the average prices quoted as paid by farmers for broiler mash or laying mash.

3/ National Miller Publications, Inc., Prospect Heights, Ill.

4/ Illinois was chosen for this study because wholesale prices of complete feeds and ingredients were more readily available in that State than elsewhere (see section on methodology).

5/ The formulas from the 1947 Feed Trade Manual were used in this section to show the influence of price changes for ingredients without the influence of improvements in the formulas.

nate ingredients are directly related to their value in the formula (the second procedure suggested above). If these margins are identical or similar, then prices of ingredients may be closely associated with their value in the formula and differences in the formulas make little difference in the size of the margin. The manufacturer-wholesaler's margin is defined as the difference between the price of broiler or laying mash at wholesale and the cost of the separate ingredients on the wholesale market. Retailing margins are not considered because it is assumed that they will be approximately equal for a given type of feed regardless of the ingredients used.

These data show that the prices of alternate ingredients are not equated to their value in a feed since they do not yield accurate margins irrespective of the formula chosen. The larger of the two manufacturer-wholesaler margins for broiler mash was nearly double the smaller one for the same type of feed. The difference between the two margins for laying mash was about one-fourth (table 1).

Table 1.--Manufacturer-wholesaler margins for the 1947 high-grain and low-grain formulas: The larger of the 2 margins as a percentage of the smaller, Illinois, 1953-58

Year	Broiler mash	Laying mash
	Percent	Percent
1953	182	128
1954	177	136
1955	237	125
1956	197	119
1957	172	115
1958	148	127

Greatly different manufacturer-wholesaler margins are obtained, therefore, depending upon which formula is used in the analysis. In studying the size of the manufacturer-wholesaler margin the problem is to determine which of these formulas was the largest selling broiler or laying mash and was sold at the prices reported. Possibly the reported prices are related to only one of these formulas or possibly to some combination of them. If the price of the high-grain broiler formula used in this study was representative of prices paid by farmers for broiler mash in 1955, this manufacturer-wholesaler margin barely covered the costs of manufacturing feed, excluding the costs of bags, tags, and twine, and excluding profits. During the same year the price of the low-grain broiler formula, if it was representative of prices paid by farmers for broiler mash, would have resulted in a very good profit.

PRICE SPREADS FOR INDIVIDUAL FORMULAS
AS INDICATORS OF TRENDS IN FORMULA FEED MARGINS 6/

Even though it is not possible to estimate the actual size of the manufacturer-wholesaler margin for a formula feed, it may be possible to indicate average trends. This is true because, as numerous studies have indicated, the prices of most of the substitutable ingredients are highly correlated. 7/ Recent studies, however, have shown somewhat less correlation since World War II than before. 8/

This possibility was tested by using the high- and low-grain formulas from the 1947 Feed Trade Manual. General similarities in trend can be noted, but to use any fixed formula to indicate trends in margins without recognizing the existence of the others would be inaccurate. For example, the manufacturer-wholesaler margin increased 76 percent for the high-grain broiler ration, 4 percent for high-grain laying mash, and 42 percent for low-grain broiler mash from 1954 to 1958.

The most noteworthy difference in the trends, based upon 1947 formulas, is found between 1954 and 1955. During this period the margin for high-grain broiler mash decreased substantially while the margin for low-grain broiler mash remained stable. This difference was almost entirely the result of the fact that the high-grain formula contained dried skim milk and fish meal, which rose in price during the period, while the low-grain formula contained corn gluten and more soybean meal which declined in price during the period. Other differences in trend also were noted.

This implies that (1) no one formula, unless it is a representative one, can be used to study trends in margins, and (2) undoubtedly this representative formula will have to vary with changes in the relative prices of ingredients. This latter qualification seems necessary since it is difficult to imagine that a majority of the formula feed companies would have continued, for example, to use dried skim milk and fish meal in 1955 if soybean and corn gluten plus additives resulted in equally good feed. Even without the use of computers to compute least-cost rations, within nutritional and other limits, some substitution of this type would have occurred.

Thus, some representative and changing formula for each type of feed appears necessary to indicate accurately even the trend in margins if proportions of ingredients or retail quality of feeds remain unknown. In the absence of such information this report shows margin trends by using two widely different formulas for each type of feed. It is expected that the contrasting trends for the two formulas, even though they cannot show the specific changes which have taken place, will give some general indication of the actual trend. This has not been available previously.

6/ See footnote 4.

7/ R. J. Foote, J. W. Klein, and M. Clough. The Demand and Price Structure for Corn and Total Feed Concentrates. U. S. Dept. Agr., Tech. Bul. 1061, Oct. 1952.

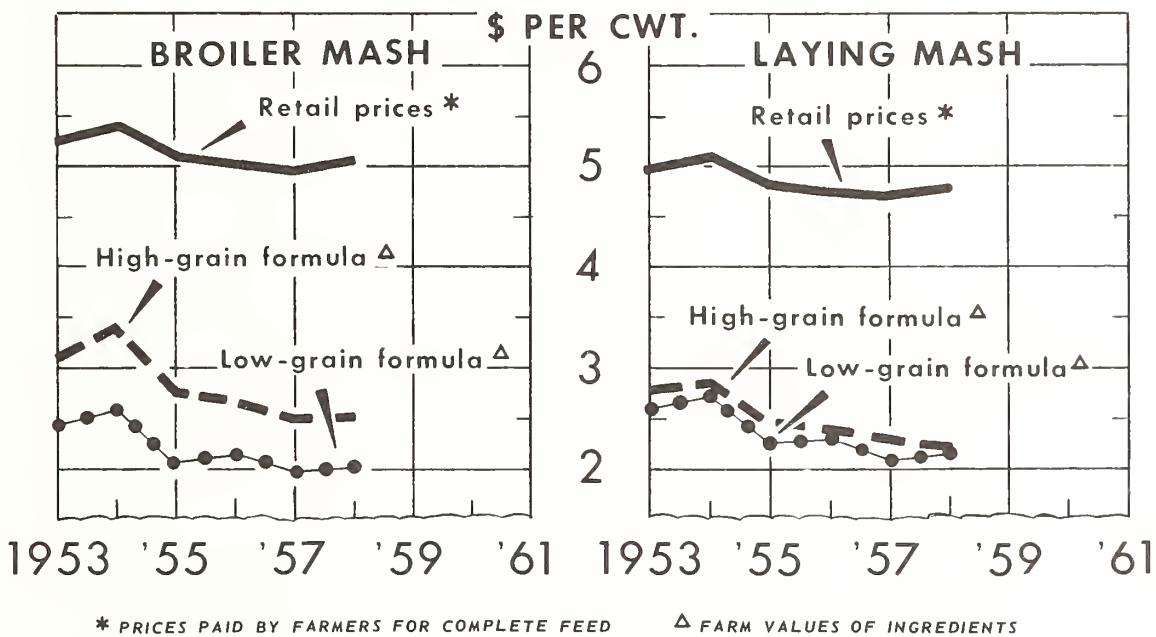
8/ Feed Situation. U. S. Dept. Agr., July 1959.

PRICE TRENDS

Prices paid by farmers for formula feeds and prices received by farmers for the major ingredients all tended downward from 1953 through 1958 (fig. 1 and table 2). Farm-produced ingredients and byproduct ingredients derived from farm products represented between 90 and 95 percent of the volume of broiler- and laying-mash formulas.

RETAIL PRICES AND FARM VALUES FOR FORMULATED POULTRY FEEDS

Estimated Trends in Illinois Based on Alternative Formulas



U. S. DEPARTMENT OF AGRICULTURE

NEG. 7576-59 (11) AGRICULTURAL MARKETING SERVICE

Figure 1

Prices paid by farmers for broiler and laying mashes, however, decreased much less rapidly than prices of any of the major ingredients considered in this analysis (fig. 1 and table 2). This implies that the marketing margin for formula feeds increased during the period. It also implies that given an impetus toward least-cost formulation the industry should have used more grain and soybeans during the period. Such a trend appears to have occurred; see section on marketing of ingredients.

Table 2.--Trends in prices of formula feed and in farm value of ingredients,
Illinois, 1953-59

Year and quarter	(1953-54 = 100)					
	Prices paid by farmers		Farm value of grain 1/	Imputed farm value of specific ingredients		
	Broiler mash	Laying mash	Bran	Middlings	Soybean meal	
	Percent	Percent	Percent	Percent	Percent	Percent
1953	99	99	100	104	102	90
1954	101	101	101	96	98	110
1955	96	96	88	88	91	71
1956	95	94	90	94	95	67
1957	94	94	82	86	84	63
1958	95	95	77	81	82	67
1958:						
January-March ..	94	92	73	86	87	61
April-June	95	96	83	91	93	70
July-September ..	97	97	82	67	68	73
October-December:	94	95	71	80	81	64
1959:						
January-March ..	95	98	76	88	88	71
April-June	94	97	82	76	77	74
July-September ..	92	95	80	71	72	68

1/ Assuming 75 percent corn and 25 percent oats as the grain ingredients.

TRENDS IN PRICE SPREADS

Manufacturer-Wholesaler and Retailer Margins

The price spread between the cost of ingredients at wholesale and the prices paid by farmers for broiler and laying mashes has increased during the period studied, apparently irrespective of the formula considered (table 3). The most rapid increase occurred in the price spread for the 1957 high-grain broiler mash formula (about 20 percent between 1953-54 and 1958). The price spread for the 1947 low-grain broiler and laying mash and the 1957 high-grain laying mash showed increases of between 10 and 15 percent from 1953-54 to 1958.

Most of the increased spread between the cost of ingredients at wholesale and the price paid by the farmer for high-grain broiler mash would have been retained by the manufacturer-wholesaler (tables 4 and 5), although apparently little of this type of ration was produced and sold at the prices quoted for the earlier years of this period. In all laying-mash formulas the increase in the spread appears to have been divided fairly evenly between the manufacturer-wholesaler and the retailer. Assuming that both the broiler and layer formulas were sold at the average prices paid by farmers in 1954, the manufacturer-

Table 3.--Trends in price spread between cost of ingredients at wholesale and prices paid by farmers for broiler and laying mash, Illinois, 1953-59

(1953-54 = 100)				
Year and quarter	Broiler mash formulas		Laying mash formulas	
	1947	1957	1947	1957
	Low grain	High grain	Low grain	High grain
:				
:	Percent	Percent	Percent	Percent
1953	101	104	100	98
1954	100	96	99	102
1955	111	116	108	106
1956	108	114	108	104
1957	112	121	116	110
1958	110	116	112	114
:				
1958:	:			
January-March	114	125	113	113
April-June	106	111	111	114
July-September	113	114	112	117
October-December ...:	106	115	110	113
:				
1959:	:			
January-March	106	118	110	121
April-June	106	114	117	117
July-September:	111	115	126	115
:				

wholesaler margins for high-grain broiler rations were only about half the absolute size of those for low-grain broiler rations and for low- and high-grain laying rations. This was true regardless of whether the 1947 or 1957 low- or high-grain rations were considered (see methodology section). As a result of relative decreases in prices of grain and meal, by 1958 the manufacturer-wholesaler margin for high-grain broiler rations approximated those for other rations. The manufacturer-retailer margin also rose but not so sharply.

This increase in the manufacturer-wholesaler margin for the high-grain formula for broiler mash, until it approximately equaled the margin for the low-grain formula in 1958, plus the interest of the broiler industry in high-energy feeds, probably caused a considerable shift from the production of low-to high-grain formulas from 1953 to 1958. Therefore, trends in the margin for individual formulas must be disregarded and some composite margin must be considered. This can be done by inspecting table 4. Although not all possible formulas have been considered, this study indicates that the trend in the manufacturer-wholesaler margin may approximate or be somewhat less than that shown in table 4 for the low-grain broiler formula.

The trends in margins as shown in tables 4 and 5 disclose one other difference for broiler feeds. This difference is shown through the sizable reduction in the retail margin between 1957 and 1958. This reduction in the retail margin approximately equals the increase in the manufacturer-wholesaler margin

Table 4.--Trends in manufacturer-wholesaler margins for broiler and laying mash, Illinois, 1953-59

(1953-54 = 100)

Year and quarter	Broiler mash formulas		Laying mash formulas	
	1947	1957	1947	1957
	Low grain	High grain	Low grain	High grain
:	Percent	Percent	Percent	Percent
1953	100	111	95	88
1954	99	91	104	111
1955	99	106	112	106
1956	112	133	119	108
1957	120	152	124	107
1958	140	185	114	119
:				
1958:				
January-March	120	153	116	111
April-June	140	186	115	124
July-September ...:	161	211	118	131
October-December ..:	137	189	106	110
:				
1959:				
January-March:	133	191	102	128
April-June	130	173	107	110
July-September ...:	131	162	128	103
:				

which also occurred between 1957 and 1958. This may be only a temporary phenomenon; however, if it indicates the start of a trend it may be the result of the absorption of some retailer services by the manufacturer-wholesaler.

Normally the manufacturer-wholesaler is assumed to procure the ingredients, minor elements, and drugs; grind, mix, bag, and warehouse them; service the retailers; and often deliver the feed to the retailers. The retailer often is billed for the feed f.o.b. plant; he receives the feed, stocks or warehouses it, sells it, and delivers it to the farm, frequently providing a short period of free credit. Possibly the shift in margins for broiler mash between 1957 and 1958 results from increased integration, with the manufacturer-wholesaler offering some new or additional services to broiler producers and thus reducing the amount of services required from the retailer.

Much of the general upward trend in the manufacturer-wholesaler and the retailer margins from 1953 to 1958 as shown in tables 4 and 5 appears to be the result of cost increases. Wage rates in the prepared feeds industry increased 19 percent, and costs for rail transportation of grain rose about 18 percent during the period. Increased efficiency in the use of production labor in the feed mixing industry appears to have partially offset increases in wage rates. The amount of production labor required to produce a ton of feed has been decreasing almost 3 percent per year. Data from the Census of Manufactures indicates, however, that sales and office staffs have been increasing rapidly.

Table 5.--Trends in retailers' margins for broiler and laying mash,
Illinois, 1953-59

(1953-54 = 100)			
Year and quarter	Broiler mash	Laying mash	
:	Percent	Percent	
1953	99	104	
1954	100	96	
1955	122	106	
1956	101	102	
1957	101	112	
1958	71	111	
:			
1958:			
January-March	108	115	
April-June	61	107	
July-September	51	109	
October-December	65	113	
:			
1959:			
January-March	70	116	
April-June	76	122	
July-September	86	123	
:			

Similar cost increases also explain much of the increase in the processing, handling, storage, and merchandising margins for the ingredients used in preparing these poultry feeds.

Marketing of Ingredients

The cost of ingredients at wholesale market prices represents between 60 and 80 percent of the value of the broiler and laying mashes sold by the manufacturer-wholesaler. Many services are performed by many different industries before these ingredients are used by the feed manufacturing industry.

Some ingredients, such as whole grains, must be assembled, stored, and transported. Others must also be processed--for example, soybean meal, bran, and middlings. In all cases risk and merchandising are involved.

In view of the large number of byproducts used in the formula feed industry, trends in the marketing margins cannot be ascertained for all ingredients. However, approximate trends have been computed for corn and oats, bran and middlings, and soybean meal (table 6). Corn and oats represented between 80 and 100 percent of all the whole grains used in the formulas and whole grains represented between 40 and 60 percent of the entire formula. Soybean meal represented between 85 and 100 percent of all the meals used in the formulas and meals represented between 10 and 20 percent of the entire formula. The

Table 6.--Trends in processing, handling, and storage margins for specified major ingredients of formula feed, Illinois, 1953-59

Year and quarter	(1953-54 = 100)		
	Corn and oats	Soybean meal 1/	Wheat bran and middlings 1/
	Percent	Percent	Percent
1953	100	106	97
1954	100	94	103
1955	100	162	103
1956	111	144	89
1957	133	156	92
1958	144	188	102
1958:	:		
January-March	156	175	87
April-June	122	175	85
July-September	122	188	114
October-December	178	212	120
1959:	:		
January-March	122	162	101
April-June	111	119	118
July-September	122	150	101
	:		

1/ Trends in spreads between Chicago wholesale prices and estimated farm values. Farm values are estimated by allocating the farm value of grain required per unit of product to the joint products of milling on the basis of wholesale values. For example, if bran accounts for 7 percent of the total mill value of flour, bran, and middlings, it is assumed that 7 percent of the farm value of the wheat can be attributed to bran. Basic data used to estimate farm values of the mill feeds and soybean meals are compiled for the calculation of other price spread series of the Agricultural Marketing Service.

flour mill byproducts used in the formula were bran and middlings; these products represented about 25 percent of all ingredients in the 1947 formulas. No bran nor middlings were used in the 1957 broiler and laying formulas chosen for this analysis. Thus, the commodities for which estimated processing, handling, and storage margins are shown in table 6 represent ingredients which account for more than 80 percent of the broiler and laying mash formulas analyzed in this report.

While margins for corn and oats (spread between the prices received by farmers and the wholesale prices of ingredients) have increased somewhat more rapidly than the increases in major cost items, the margins for the two by-product groups have not moved together. During 1953-58 the processing, handling, and storage margin for soybean meal increased rapidly, while that for bran and middlings has decreased slightly (table 6). Without a complete

Table 7.--Trends in farmer's share of retail price of broiler and laying mash,
Illinois, 1953-58

Year	1947 Formulas	1957 Formulas
1953	Percent 51	Percent 58
1954	52	60
1955	45	53
1956	48	51
1957	44	49
1958	43	48
:	:	:

analysis of the major oil and flour markets it is impossible to determine the cause of these trends in marketing margins. However, it appears likely that the increased margins shown for feeds with high grain and soybean content, plus the considerable interest in the formula feeds industry and the broiler industry in high-energy feeds, were at least partially responsible for these trends. This interest in high-energy feeds and the trend toward lower grain and meal prices apparently caused a slight reduction in the prices and margins for wheat bran and middlings and permitted a rise in the price of soybean meal at a time when soybean oil prices and margins were decreasing.

The Farmer's Share

An approximate farmer's share for poultry feeds can be estimated by using the preceding analyses and assuming that the farmer's share for the other by-product ingredients approximates that for soybean meal. The farmer's share varies considerably depending upon the type of formula used in the analysis (table 7). When the lower grain formulas such as the 1947 formulas are considered the farmer's share approximates 45 percent; it is about 54 percent when the 1957 higher grain formulas are considered. In either event the farmer's share appears to have decreased about one-fifth during the period if fixed formulas are assumed. However, the trend toward more high-grain feeds undoubtedly resulted in a composite farmer's share which has decreased only a small amount.

METHODOLOGY

Prices paid by farmers for 100 pounds of laying mash and broiler mash are reported by the Agricultural Estimates Division as of the 15th of each month. These prices are available by States. They are in effect the average prices paid by farmers for the largest selling line in each of the specified types of feed at each reporting establishment. Prices of laying mash have been published since 1951 and broiler mash prices since January 1954. These prices are used throughout the report to represent the retail prices or those paid by

farmers for broiler and laying mash.

In any price spread analysis it is necessary to reconstruct comparable price series for several other levels in the marketing system. Usually it is possible to approximate, for example, an acceptable average formula for bread. With the lack of retail quality specifications for feed and in recognition of the wide variety of ingredients used, no attempt was made to determine an equivalent average formula. Instead, this report seeks to answer the objectives of the study through an examination of the price spreads for a particular formula containing a large amount of whole grain and one containing a small amount of whole grain for each type of feed priced at retail. The contrast in the size and trends in these margins resulting from the use of each formula therefore shows the approximate variation in size or trend which can result through the use of alternative formulas for each assumed retail price.

The true extremes in high- and low-grain formulas could not be determined because of the tremendous range of possible formulas which could be sold as laying mash and broiler mash. The formulas were selected from various alternative formulas contained in the 1947 and 1957 Feed Trade Manuals. These sources probably represent summarizations of formulas with higher costs and possibly higher feeding values than those usually used to produce each type of feed. Since the 1947 manual contained a greater range between the high- and low-grain formulas, these formulas were used to test the validity of the resulting price spreads as indicators of actual margins or trends in margins. Table 8 summarizes the high- and low-grain formulas used in computing the equivalent ingredient prices for laying mash. Similar formulas probably still are available in the market; however, vitamin B₁₂, antibiotics, and other minor ingredients have been introduced since 1947, and the 1957 formulas also were used in the actual summarization and analysis.

Thirty-three different ingredients and additives had to be priced at the wholesale level. 9/ Although wholesale prices were not available for all of these ingredients in any one market in the United States, prices for most of them were available in the Chicago market. Therefore, this study concentrated on Illinois. Government sources were used for 12 ingredients. Trade sources were used for 11 additional ingredients. The remaining 10 ingredients were obtained from a special survey. Only four of these price series are based upon prices in other cities than Chicago. These series were adjusted for the cost of transportation to Chicago whenever this cost was considered to be important. Since prices paid by farmers for the formula feed are reported for the 15th of the month, all of the ingredient prices for various days of the week preceding the 15th of the month were used to compute the cost of ingredients. The special survey pertained primarily to minor ingredients and additives, for which annual prices were obtained since it was impossible to obtain specific daily prices. These general trends are believed to be sufficiently accurate because (1) the value of these items per ton of feed was low and (2) most of the items involved only slow changes in price. The price spreads or margins analyzed are therefore

9/ Bagged prices were used throughout the report although since October 1958 the Department price series are reported on a bulk basis.

Table 8.--Ingredients in high- and low-grain laying mash formulas, 1947 and 1957

Ingredient	High grain		Low grain	
	1947	1957	1947	1957
Barley	Lb.: --	600	--	--
Corn	Lb.: 770	920	--	720
Oats	Lb.: 300	--	100	400
Wheat bran	Lb.: 100	--	200	--
Wheat middlings	Lb.: 500	--	500	--
Corn gluten meal	Lb.: --	--	--	80
Hominy feed	Lb.: --	--	650	--
Butyl fermentation solubles	Lb.: --	30	--	--
Distillers dried solubles	Lb.: --	--	--	80
Peanut meal (45 percent)	Lb.: --	--	100	--
Soybean oil meal (46 percent)	Lb.: 50	210	200	320
Condensed fish solubles	Lb.: --	--	--	60
Fish meal (60 percent)	Lb.: 50	100	50	--
Meat scraps (50 percent)	Lb.: 150	--	150	120
Alfalfa meal dehydrated (17 percent) ...	Lb.: 50	60	--	40
Dicalcium phosphate	Lb.: --	35	--	90
Calcium carbonate	Lb.: 40	35	40	70
Manganese sulfate	Lb.: --	.25	--	.5
Iodized salt	Lb.: 10	10	20	20
Steamed bonemeal	Lb.: --	--	30	--
Vitamin A-D feeding oil	Lb.: 3	4	3	6
Vitamin B ₁₂	Mg.: --	2	--	--
Calcium pantothenate	Gm.: --	3	--	5
Choline chloride	Gm.: --	150	--	400
Niacin	Gm.: --	6	--	26
Riboflavin (synthetic)	Gm.: 1	1.5	--	4
Antibiotic (procaine penicillin)	Gm.: --	10	--	10
Total	Lb.: 2,023	2,004.63	2,043	2,007.48

concurrent. The 33 ingredients and additives used in the formulas and the source of wholesale prices used are summarized as follows:

Grain Market News (U. S. Dept. Agr.)

Barley No. 3 feed type	Milo No. 2 yellow
Corn No. 3 yellow	Oats No. 2 heavy white

Feed Market News (U. S. Dept. Agr.)

Alfalfa meal dehydrated (17 percent protein)	Peanut oil meal (45 percent protein)
Corn gluten meal (41 percent protein)	Soybean oil meal (44 percent protein)
Hominy feed, yellow	Wheat bran, standard
Meat scraps (50 percent protein)	Wheat middlings, standard

"Feedstuffs" (trade publication)

Animal fat, stabilized	Fish meal (60 percent protein)
Bone meal, steamed	Niacin
Calcium carbonate	Riboflavin
Dicalcium phosphate (18.5 percent phosphorus)	Vitamin A-D feeding oil (300 D, 2,250 A)
Dried brewers yeast	Vitamin E
Dried skim milk	

Special survey for this study

Butyl fermentation solubles	Iodized salt
Calcium pantothenate	Manganese sulfate
Choline chloride	Vitamin B ₁₂
Condensed fish solubles	Procaine penicillin
Distillers dried solubles	Methionine

An average wholesale price series for laying mash and broiler mash also was available for the Chicago market since 1953. 10/ This series was used to obtain the retail and the wholesale-manufacturing margins from the overall margin for formula feeds.

It was not possible to reconstruct the complete farm equivalent value for each of these feeds. Many ingredients are byproducts; a complete analysis of the major and all minor byproduct prices and yields is required to estimate the farm equivalent value for any given byproduct. Other margin studies assume that the farm equivalent values for soybean oil and wheat flour bear the same relationship in the farm commodity as they do in the sale of all products made from that commodity. This same assumption is applied to obtain the farm equivalent values for the byproducts soybean meal, bran, and middlings.

10/ Grain and Feed Market News.

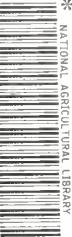
The grain ingredients represented between 40 and 60 percent of the value of ingredients and are purchased by the formula feeds industry in basically the same form as they are sold by the farmer. Prices of corn and oats, therefore, were compared directly. Price spreads between the price received by the farmer and the wholesale ingredient prices for corn and oats were used to compute the grain merchandising, handling, and storage margins since (1) the value of corn and oats represents about 67 percent of the value of all the grain ingredients used in poultry feeds, and (2) most other farm and wholesale prices of feed grain correlate very highly with corn prices.

The prices received by farmers on the 15th of the month, expressed, where necessary, as estimated farm equivalent values, were then compared with (1) the wholesale prices of ingredients to estimate the ingredient processing, handling, and storage margin, and (2) the prices paid by farmers for the formula feed to estimate the farmer's share. 11/

The necessary price information is available for the period since 1953. The years 1953 and 1954 were used as the base in constructing the index for each of the marketing margins and the farmer's share.

11/ Farm equivalent values are the farm values of the wheat or soybeans equivalent to the quantity of bran, middling, and soybean meal used in each formula.

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